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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,271	07/29/2003	Marvin Glenn Wong	10020699-1	5689

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AGILENT TECHNOLOGIES, INC.  
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Intellectual Property Administration  
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EXAMINER

THOMPSON, CRAIG

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/629,271

**Applicant(s)**

WONG ET AL.

**Examiner**

Craig A. Thompson

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 19-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-23 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/29/2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-18, drawn to device, classified in class 148, subclass 33.
- II. Claims 19-23, drawn to process, classified in class 438, subclass 758\*.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product of group I can be made by materially different processes included those utilizing injection or curing.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

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During a telephone conversation with Cynthia Mitchell on 11/17/2004 a provisional election was made with traverse to prosecute the invention of Group 1, claims 1-18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 19-23 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Regarding Prior Art***

An information disclosure statement was filed of 7-29-2003 that lists 35 pages of printed Internet pages, which were not indexed or numbered. The pages were all printed from the 3M Specialty Additives home page for glass and ceramic microspheres and were apparently printed one week prior to the submission of the current application (based on the date stamp on the printout). These pages were scanned into the PAIR system as one document and coded as non-patent literature. For purposes of examining the current invention this document has been page numbered 1 to 35 to match the order in which the plurality of pages were scanned. Additionally the prior art when discussed below is referred to as 3Mnpl.

***Claim Rejections - 35 USC § 102(a)***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(a) that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1 is rejected under 35 U.S.C. 102(a) as being anticipated by 3Mnpl (explained above). The examiner notes that claim 1 appears to read on a published use of a commercially available product sold by 3M™. 3Mnpl—page 4 teaches the 3M™ Scotchlite™ Glass Bubbles are engineered hollow glass microspheres (Introduction, first sentence). Additionally 3Mnpl—page 3 teaches that Scotchlite glass bubbles have been incorporated into the board material in printed circuit boards because they impart a low dielectric constant and a high dielectric strength. Therefore claim 1 is anticipated. With respect to the preamble's requirement of a semiconductor substrate, the limitation is present because a substrate on which a semiconductor device is made is a semiconductor substrate and a printed circuit board necessarily has a circuit semiconductor device. Furthermore 3Mnpl—page 6 teaches that conductivity of the microspheres increases with product density and 3Mnpl—page 7 teaches that the dielectric constants of composite materials will depend on the matrix material and volume loading on the material. With respect to claims depending on claim 1, the examiner notes that 3Mnpl—page 1 clearly explains that all of the glass and ceramic microspheres are useful for improving designed to enhance product properties and improve processability in a wide range of industries. The examiner furthermore takes

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notes generally that the express advantages of weight control, water resistance, high filler loading and reduced warpage and shrinkage set forth in the first figure are all common advantages or variables considered in a variety of semiconductor substrate processes and devices.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over 3Mnpl in view of Cohen et al. (US Publication US2001/0029974, "Cohen"). 3Mnpl fails to expressly teach the use of ceramic microspheres with a semiconductor substrate. This limitation is obvious over the 3Mnpl reference because 3Mnpl—page 13 teaches using the ceramic microspheres to reduce density and increase filler loading. Therefore the use at the time of invention for use in a printed circuit board (as taught by 3Mnpl—page 3) would be an obvious. The motivation at the time of invention would have been reduced density and increased filler loading.

3Mnpl fails to expressly teach the use of gas filled hollow microspheres. Cohen teaches the use of gas filled hollow microspheres in making a combustor for use in such small electronic devices a MEMS and portable electronic devices (see paragraph 0006). The reference specifically teaches using gas filled particles as well as glass

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microspheres as a means to control (or reduce) thermal conductivity (see paragraph 0051). Cohen specifically teaches compatibility with semiconductor fabrication processes (see paragraph 0068). Therefore at the time of invention it would have been obvious in the art of semiconductor fabrication to have modified the teachings of 3Mnpl to use gas filled hollow microspheres as in claims 2 and 3 as taught by Cohen. The motivation at the time of invention would have been reduced thermal conductivity. With respect to claim 3, the limitation of glass microspheres is addressed in claim 1 above.

Claims 4, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over 3Mnpl and Cohen as applied to 1, 2, and 3, respectively above and further in view of Carter et al. (U.S. Patent No. 6,110, 649, "Carter"). The combined teachings of 3Mnpl and Cohen do not teach sintering. Carter teaches that it is taught in the prior art (Lui et al. article discussed) to use sintered hollow microspheres (column 1, lines 33-40). The reference also teaches that such composites have desirable lower dielectric constants (column 1, lines 30-33). Therefore at the time of invention it would have been obvious to one of ordinary skill to have modified the teachings of 3Mnpl and Cohen to use sintering to form a crystallized composite substrate as in claims 4, 5, and 6 and as taught by Carter. The motivation at the time of invention would have been desirable dielectric properties as expressly taught by Carter. With respect to any argument that Carter teaches away from using hollow microspheres, i.e. "such high temperatures are unsuitable for some manufacturing processes for integrated circuits" (column 1, lines 37-40), the examiner notes that such temperatures would not be

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problematic here because the material being formed is the substrate. Furthermore Carter teaches that the resulting substrate material *would* have desirable properties.

Claims 7, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over 3Mnpl, Cohen and Carter as applied to 4, 5, 6, respectively above. The crystallized composite would be a hardened matrix. Therefore these claims are rejected for those reasons provided above.

Claims 10, 11, and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over 3Mnpl and 3Mnpl/Cohen as applied to claims 1, 2, and 3 above and further in view of Leroux et al. (US Publication US2002/0090514, "Leroux"). The combined teachings of 3Mnpl/Cohen fail to teach use of a glaze with the hollow microsphere layer. Leroux teaches use of a protective glaze on an insulating layer (see abstract) and is taught for processes involving refractory metals which are common in semiconducting technology (see paragraph 0002). The reference specifically teaches reduced delamination (abstract). Therefore at the time of invention it would have been obvious to one of ordinary skill in the art of semiconductor manufacturing to have modified the teachings of 3Mnpl/Cohen to have used a glaze as in claims 10, 11 and 12 and as taught by Leroux. The motivation at the time of invention would have been decreased delamination as expressly taught by Leroux.

Claims 13, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over 3Mnpl and 3Mnpl/Cohen as applied to claims 1, 2, and 3 above and further in view of Ushifusa et al. (US Patent Re. 34,887, "Ushifusa") Ushifusa teaches a ceramic circuit board (title). The reference specifically teaches using hollow

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microspheres (abstract) including sodium containing glass (column 4, lines 13-24) which is a low temperature glass (column 4, lines 9-13). The reference specifically teaches the modification to make a semiconductor module with high reliability in its solder joints (which is essentially improved quality). Therefore at the time of invention it would have been obvious to have modified the teachings of 3Mnpl/Cohen to use an outer layer of low temperature glass as in claims 13, 14, and 15, as taught by Ushifusa. The motivation at the time of invention would have been improved (or highly reliable) solder joints as expressly taught in Ushifusa.

With respect to claims 16, 17, and 18 the limitation of the hollow microspheres being sintered together with the outer layer of glass, Ushifusa teaches sintering (column 4, lines 3-13). Therefore these claims are rejected for those reasons provided for claims 13, 14, and 15 above.

#### ***Cited Prior Art***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lodel Nitta KK (Derwent Abstracted Publication No. JP2003017481A) has priority to June 29, 2001 and teaches using hollow microsphere elements in a low-dielectric constant insulating film material for semiconductor devices (see figure 1). Harvey et al. (U.S. OCR Patent No. 3,256,105, provided) teaches a ceramic composition with hollow microspheres (see claim 1) in conjunction with a glaze (top of page 8) to provide a workable molding consistency (see page 3). Bae et al.

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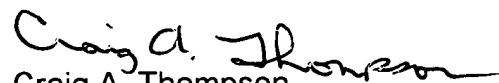
(Derwent Abstracted Publication No. KR2002007774A) teaches a method for making ceramic hollow microspheres for a substrate.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Thompson whose telephone number is (571)272-1699. The examiner can normally be reached on Monday-Friday 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Craig A. Thompson  
Primary Examiner  
Art Unit 2813

10 December 2004